

**IN THE UNITED STATES  
PATENT AND TRADEMARK OFFICE**

Appl. No. : 10/511,798  
Applicants : Dirk Jeroen BREEBAART et al.  
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Examiner : PAUL, Disler  
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Title: SIGNAL SYNTHESIZING

**APPEAL BRIEF**

Mail Stop **Appeal Brief - Patents**  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

In response to the FINAL Office Action dated 21 October 2009, and in support of the Notice of Appeal filed on 12 April 2010, Applicants hereby respectfully submit this Appeal Brief.

**REAL PARTY IN INTEREST**

Koninklijke Philips Electronics N.V. owns all of the rights in the above-identified U.S. patent application.

**RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences related to this application or to any related application, nor will the disposition of this case affect, or be affected by, any other application directly or indirectly.

### **STATUS OF CLAIMS**

Claims 9 and 10 are canceled.

Claims 1-8 and 11-22 are pending in the application.

Claims 14, 19 and 22 are all objected to.

Claims 1-8, 11-13, 15-18 and 20-22 all stand rejected.

Accordingly, the claims on appeal are claims 1-8, 11-13, 15-18 and 20-22.

### **STATUS OF AMENDMENTS**

There are no pending amendments with respect to this application. The last Amendment to this application was filed on 12 February 2009 and entered by the Examiner by the Office Action dated 16 April 2009.

### **SUMMARY OF CLAIMED SUBJECT MATTER**

The present invention is directed to a display device.<sup>1</sup>

Accordingly, as broadly recited in claim 1, in a decorrelator (FIG. 2), a method is provided of synthesizing a first (Fig. 2 – L; page 5, line 21) and a second (Fig. 2 – R; page 5, line 21) output signal from an input signal (Fig. 2 – x; page 5, line 2). The method comprises: applying the input signal to a filter (Fig. 2 – 201; page 5, line 2) of the decorrelator to generate a filtered signal ( $H \otimes x$ ; page 5, lines 2, 20 and 31; page 6, lines 16-17); obtaining from an analysis circuit (Fig. 2 – 202; page 5, line 12-14) of the decorrelator a correlation parameter ( $\rho$ ; page 5, line 6) indicative of a desired correlation between the first and second output signals; obtaining from the analysis circuit of the decorrelator a level parameter ( $c$ ; page 5, lines 6-7) indicative of a desired level difference between the first and second output signals; and applying the

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1 In the description to follow, citations to various reference numerals, figures, and corresponding text in the specification are provided solely to comply with Patent Office rules. It should be understood that these reference numerals, figures, and text are exemplary in nature, and not in any way limiting of the true scope of the claims. It would therefore be improper to import anything into any of the claims simply on the basis of **exemplary** language that is provided here only under the obligation to satisfy Patent Office rules for maintaining an Appeal.

input signal and the filtered signal to a transformation circuit (Fig. 2 – 203; page 5, lines 15-17) of the decorrelator and performing by a matrixing operation on the input signal and the filtered signal to transform the input signal and the filtered signal into the first and second output signals (page 5, lines 17-21; page 5, line 31 – page 6, line 2; page 6, lines 30-33), where the matrixing operation employs the correlation parameter and the level parameter (equation 4; page 6, line 3; page 7, lines 1-6).

As further featured in claim 5, the filtering of the input signal comprises all-pass filtering the input signal (page 5, line 2).

As broadly recited in claim 7, a device is provided for synthesizing a first (Fig. 2 – L; page 5, line 21) and a second (Fig. 2 – R; page 5, line 21) output signal from an input signal (Fig. 2 – x; page 5, line 2), comprising: a filter (Fig. 2 – 201; page 5, line 2) for filtering the input signal to generate a filtered signal ( $H \otimes x$ ; page 5, lines 2, 20 and 31; page 6, lines 16-17); an analyzer (Fig. 2 – 202; page 5, line 12-14) for obtaining a correlation parameter ( $\rho$ ; page 5, line 6) indicative of a desired correlation between the first and second output signals, and for obtaining a level parameter ( $c$ ; page 5, lines 6-7) indicative of a desired level difference between the first and second output signals; and a transformation circuit (Fig. 2 – 203; page 5, lines 15-17) for transforming the input signal and the filtered signal by a matrixing operation into the first and second output signals (page 5, lines 17-21; page 5, line 31 – page 6, line 2; page 6, lines 30-33), where the matrixing operation depends on the correlation parameter and the level parameter.

As further featured in claim 8, the device further features an input unit (Fig. 5 – input port for signal “S”; page 8, lines 29-30; page 9, line 26) for receiving an encoded audio signal; and a decoder (Fig. 5 – 406; page 7, line 33; page 9, line 26) for decoding the encoded audio signal to produce the input signal.

As further featured in claim 11, applying the input signal to the filter to generate the filtered signal comprises applying the input signal to an all-pass filter (page 5, line 2).

As further featured in claim 15, the filter means comprises an all-pass filter (page 5, line 2).

As further featured in claim 18, the analyzer receives a set of spatial

parameters pertaining to the input signal, including at least: (1) an interaural level difference (ILD) parameter; (2) at least one of an interaural time difference (ITD) parameter and an interaural phase difference (IPD) parameter; and (3) a maximum value of a cross-correlation function parameter (page 8, lines 17-32), and extracts from the set of spatial parameters the correlation parameter and the level parameter (page 5, lines 12-14).

As further featured in claim 20, in a data processing system, a method of synthesizing a first (Fig. 2 – L; page 5, line 21) and a second (Fig. 2 – R; page 5, line 21) output signal from an input signal (Fig. 2 – x; page 5, line 2), the method comprising: employing processing means (Fig. 2 – 201; page 5, line 2) of the data processing system to filter the input signal to generate a filtered signal ( $H \otimes x$ ; page 5, lines 2, 20 and 31; page 6, lines 16-17); employing the processing means (Fig. 2 – 202; page 5, line 12-14) to obtain a correlation parameter ( $\rho$ ; page 5, line 6) indicative of a desired correlation between the first and second output signals, and to obtain a level parameter ( $c$ ; page 5, lines 6-7) indicative of a desired level difference between the first and second output signals; and employing the processing means (Fig. 2 – 203; page 5, lines 15-17) to perform a matrixing operation on the input signal and the filtered signal to transform the input signal and the filtered signal into the first and second output signals (page 5, lines 17-21; page 5, line 31 – page 6, line 2; page 6, lines 30-33), where the matrixing operation employs the correlation parameter and the level parameter.

### **GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

The grounds of rejection to be reviewed on Appeal are: (1) the rejections of claims 20-22 under 35 U.S.C. § 101; (2) the rejections of claims 1-4, 7-8, and 20 under 35 U.S.C. § 102 over Irwan et al. U.S. Patent Application Publication 2002/0118840 (“Irwan”); (3) the rejections of claims 5-6, 11-12, 15-16 and 21 under 35 U.S.C. § 103 over Irwan in view of Ali U.S. Patent 6,895,093 (“Ali”); (4) the rejections of claims 13 and 17 under 35 U.S.C. § 103 over Irwan in view of Ali and further in view of Schroeder (1968) (“Shroeder”); and (5) the rejection of claim 18 under 35 U.S.C. § 103 over Irwan in view of Shaffer et al. U.S. Patent 6,973,184

(“Shaffer”).

## ARGUMENTS

### (1) Claims 20-22 Are Patentable Under 35 U.S.C. § 101

The Examiner rejects claims 20-22 under 35 U.S.C. § 101.

Applicants respectfully traverse these rejections for at least the following reasons. The Examiner states that claims 20-22 are rejected because “*the claims neither transforms the underlying subject matter nor positively ties to another statutory category . . . and may be interpreted as being done by the user without any machine.*”

Applicants respectfully disagree.

Claim 20 recites that the claimed method is employed “in a data processing system.” Claim 20 also recites, specifically, employing processing means of a data processing system to filter the input signal to generate a filtered signal.

A human being is not a data processing system. Processing means and a data processing system belong at least to the statutory class of “manufacture.”

Thus, claims 20-22 are all tied to another statutory class under 35 U.S.C. § 101.

Therefore, Applicants respectfully submit that the rejection of claims 20-22 under 35 U.S.C. § 101 is in error.

Accordingly, for at least these reasons, Applicants respectfully request that the rejections of claims 20-22 under 35 U.S.C. § 101 be withdrawn.

### (2) Claims 1-4, 7-8 and 20 Are Patentable Under 35 U.S.C. § 102 Over Irwan

At the outset, Applicants wish to note that Applicants do not bear the burden to prove that the cited reference does not disclose each and every feature of their claims (although it is sufficient to overcome a rejection to demonstrate that at least one feature is not disclosed by the cited reference). Instead, in order to sustain a rejection of Applicant’s claims under 35 U.S.C. § 102, the Examiner has the burden of showing that a single reference discloses each and every feature of Applicants’

claims – and this burden cannot be met by vague allegations based on guesses or conjectures as to where or how the reference might disclose these features. Furthermore, to sustain the Examiner's rejection of a claim under 35 U.S.C. § 102, the Board must determine for itself that the single reference discloses each and every feature of the claim.

During an Examiner interview on 8 July 2009, the undersigned attorney requested clarification of his rejections under 35 U.S.C. § 102 based on Irwan. In particular, the undersigned attorney asked the Examiner to identify exactly what signals and parameters in Irwan he believes correspond to the various specifically-recited signals and parameters of claim 1.

During that interview, the Examiner explained that he believes that Irwan discloses: (1) the signal "y" corresponding to the input signal of claim 1; (2) the signal "yb" corresponding to the filtered signal of claim 1; and (3) the "signals" "x" and "w" input to the means 23 corresponding to the first and second output signals of claim 1. Furthermore, the Examiner has indicated that: (1) means 24 of Irwan corresponds to the filter of claim 1; (2) means 23 of Irwan corresponds to the analysis circuit of claim 1; and (3) the means 25 of Irwan corresponds to the transformation circuit of claim 1.

Applicants respectfully disagree for at least the following reasons.

As recited in claim 1, the method includes applying an input signal and a filtered signal to a transformation circuit and performing a matrixing operation on the input signal and the filtered signal to transform the input signal and the filtered signal into first and second output signals.

As noted above, the Examiner states that the signal "y" in Irwan corresponds to the recited input signal, the signal "yb" corresponds to the recited filtered signal, and means 25 corresponds to the transformation circuit.

However, it is apparent from inspection of all of the embodiments shown in FIGs. 2, 3, 4, 8, 9 and 10 that in none of those embodiments is the signal "y" (supposedly corresponding to the input signal of claim 1) applied to the means 25 (supposedly corresponding to the transformation circuit of claim 1).

So it is apparent that Irwan does not disclose an input signal and a filtered signal to a transformation circuit and performing a matrixing operation on the input

signal and the filtered signal to transform the input signal and the filtered signal into first and second output signals.

Indeed, Applicants respectfully submit that Irwan does not disclose applying to any transformation circuit both: (1) an input signal; and (2) a filtered signal produced by applying the input signal to a filter.

Therefore Applicants respectfully submit that Irwan does not disclose all of the elements of claim 1.

Furthermore, claim 1 recites a transformation circuit performing a matrixing operation on the input signal and the filtered signal to transform the input signal and the filtered signal into the first and second output signals, where the matrixing operation employs a correlation parameter and a level parameter.

Again, the Examiner states that means 25 of Irwan corresponds to the transformation circuit of claim 1, and “signals” “x” and “w” input to the means 23 corresponds to the first and second output signals of claim 1.

However, it is apparent from inspection of FIGs. 2, 3, 4, 8, 9 and 10 of Irwan that means 25 does not transform anything into the “signals” “x” and “w” that are input to means 23. Indeed, the signals that are input to the means 23 appear to be completely independent of the outputs of any operations performed by the means 25 in Irwan.

Therefore, again, Applicants respectfully submit that Irwan does not disclose all of the elements of claim 1.

Applicants respectfully submit that there are many other inconsistencies in the Examiner’s attempt to somehow twist and contort FIGs. 2-3 of Irwan to somehow try to make it read onto claim 1. However, the two deficiencies mentioned above should be more than sufficient to illustrate the problem with the Examiner’s vague rejections. Applicants respectfully submit that no possible interpretation of the elements in FIGs. 2-3 of Irwan would possibly result in the method recited in claim 1.

Therefore, for at least these reasons, Applicants respectfully submit that claim 1 is patentable over Irwan. Accordingly, Applicants respectfully request that the Board reverse the rejection of claim 1.

Claims 2-4

Claims 2-4 depend from claim 1 and are deemed patentable for at least the reason set forth above with respect to claim 1. Accordingly, Applicants respectfully request that the rejections of claims 2-4 be withdrawn and claims 2-4 be allowed at this time.

Claim 7-8

Among other things, the devices of claims 7 and 8 each include a transformation circuit for transforming an input signal and a filtered signal by a matrixing operation into first and second output signals, where the matrixing operation depends on the correlation parameter and the level parameter.

For similar reasons to those set forth above with respect to claim 1, Applicants respectfully submit that no possible interpretation of the elements in FIG. 2 of Irwan would possibly a device including such a transformation circuit.

Also with respect to claim 8, the Examiner fails to identify a single element in any of the numerous figures of Irwan that even supposedly corresponds to the decoder of claim 8, but instead vaguely cites paragraphs in the background section that disclose that prior art multichannel stereo systems cannot operate on an audio signal from an existing CD unless that signal has been specially encoded for multi-channel sound.

The Examiner has been respectfully requested to cite something in any of the embodiments disclosed in Irwan that discloses, in conjunction with all of the other elements of claim 8 (including the elements of base claim 7) the encoder of claim 8, or else withdraw the rejection of claim 8.

The Examiner has declined to do so.

Accordingly, the Board should reverse his rejection of claim 8.

Therefore, for at least these reasons, Applicants respectfully submit that claims 7 and 8 are patentable over Irwan. Accordingly, Applicants respectfully request that the Board reverse the rejections of claims 7 and 8.

Claim 20

Among other things, the method of claim 20 includes employing a processing means to perform a matrixing operation on an input signal and a filtered signal to

transform the input signal and the filtered signal into the first and second output signals, where the matrixing operation employs the correlation parameter and the level parameter.

For similar reasons to those set forth above with respect to claim 1, Applicants respectfully submit that Irwan does not disclose any method that includes this combination of features.

Accordingly, Applicants respectfully request that the Board reverse rejection of claim 20.

**(3) Claims 5-6, 11-12, 15-16 & 21 Are Patentable**

**Under 35 U.S.C. § 103 Over Irwan and Ali**

Claims 5-6, 11-13, 15-17 and 21 depend variously from claims 1, 7 and 20. Applicants respectfully submit that Ali does not remedy the shortcomings of Irwan as set forth above with respect to claims 1, 7 and 20. Accordingly, claims 5-6, 11-13, 15-17 and 21 are deemed patentable for at least the reasons set forth above with respect to claims 1, 7 and 20, and for the following additional reasons.

Applicants rely on at least on the following standards with regard to proper rejections under 35 U.S.C. § 103. First, a rejection on obviousness grounds under 35 U.S.C. § 103 cannot be sustained by mere conclusory statements: instead there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. In re Kahn, 441 F.3d 977, 988, 78 USPQ2d 1329, 1336 (Fed. Cir. 2006). See also KSR International Co. v. Teleflex Inc., 550 U.S. 398, 82 USPQ2d 1385, 1396 (2007) (quoting Federal Circuit statement with approval) See M.P.E.P. § 2141(III). Second, there must be a reasonable expectation of success. *“The mere fact that references can be combined or modified does not render the resultant combination obvious unless the results would have been predictable to one of ordinary skill in the art.”* M.P.E.P. § 2143.01(III) (citing KSR International Co. v. Teleflex Inc., 82 USPQ2d 1385, 1396 (2007)). Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *“All words in a claim must be considered in judging the patentability of that claim against the prior art.”* M.P.E.P. § 2143.03 (citing In re Wilson, 424 F.2d

1382, 1385, 165 USPQ 494, 496 (CCPA 1970)). An integral part of this analysis requires establishing the level of ordinary skill in the art of invention of claim 1. See M.P.E.P. §§ 2141(II)(C) and 2141.03.

Claims 5, 11 and 15

Applicants respectfully traverse the proposed combination of Irwan and Ali with respect to claims 5, 11 and 15 for at least the following reasons.

At the outset, Applicants respectfully submit that the Examiner fails to establish the level of ordinary skill in the art of invention of claims 5, 11 and 15. As explained above, this is a fundamental requirement for maintaining a rejection under 35 U.S.C. § 103. Therefore, Applicants respectfully submit that the Examiner has not satisfied the requirements for maintaining rejections of claims 5, 11 and 15 under 35 U.S.C. § 103.

Furthermore, the Examiner fails to provide any reasoning with any rational underpinnings to support the conclusion that it would have been obvious to have replaced Irwan's band pass filter in means 24 with an all-pass filter, or to establish that there would have been a reasonable expectation that a successful device could be produced with such a substitution. In that regard, it is noted that Ali teaches the use of all-pass filters in an acoustic echo cancellation system between a transmitting room with multiple microphones and a receiving room with multiple speakers. The Examiner has provided no reason why anyone of ordinary skill in the art would have even considered transplanting the all-pass filters from Ali's echo cancellation system, to some unidentified position within Irwan's multichannel audio converter for a karaoke machine.

For this additional reason, Applicants respectfully submit that the Examiner has failed to make a *prima facie* case for the rejection of claims 5, 11 and 15.

Accordingly, Applicants respectfully request that that the Board reverse the rejections of claims 5-6, 11-12, 15-16 and 21.

**(4) Claims 13 & 17 Are Patentable**  
**Under 35 U.S.C. § 103 Over Irwan, Ali & Schroeder**

Claims 13 and 17 depend respectively from claims 1 and 7. Applicants

respectfully submit that Schroeder does not remedy the shortcomings of Irwan and Ali as set forth above with respect to claims 1 and 7. Therefore, claims 13 and 17 are deemed patentable for at least the reasons set forth above with respect to claims 1 and 7. Accordingly, Applicants respectfully request that the Board reverse the rejections of claims 13 and 17.

**(5) Claim 18 Is Patentable Under 35 U.S.C. § 103 Over Irwan & Shaffer**

Claim 18 depends from claim 7. Applicants respectfully submit that Shaffer does not remedy the shortcomings of Irwan as set forth above with respect to claim 7. Therefore, claim 18 is deemed patentable for at least the reasons set forth above with respect to claim 7, and for the following additional reasons.

Among other things, in the device of claim 18 the analyzer receives a set of spatial parameters pertaining to the input signal including at least: (1) an interaural level difference (ILD) parameter; (2) at least one of an interaural time difference (ITD) parameter and an interaural phase difference (IPD) parameter; and (3) a maximum value of a cross-correlation function parameter, and extracts from the set of spatial parameters the correlation parameter and the level parameter.

At the outset, Applicants respectfully submit that the Examiner has not cited anything in any of the references which discloses or suggests that an analyzer receives a set of spatial parameters pertaining to an input signal including a maximum value of a cross-correlation function parameter.

Instead, the Examiner offers a mere conclusory statement that “*it would have been obvious*” to have modified Irwan to include this feature and that this supposedly somehow would “*obtain a directional cue of the produced sound*.”

However, the Examiner fails to explain how or why it is believed that such a modification would indeed “*obtain a directional cue of the produced sound*” or how or why one of ordinary skill in the art at the time of the invention supposedly would have recognized this. Also, the Examiner fails to explain how or why anyone even would be trying to “*obtain a directional cue of the produced sound*” for Irwan’s multichannel audio converter for a karaoke machine.

Furthermore, Applicants respectfully traverse the proposed combination of

Irwan and Shaffer with respect to claim 18.

The Examiner fails to provide any reasoning with some rational underpinning to support the proposed modification to Irwan to include an that analyzer receives a set of spatial parameters pertaining to the input signal including at least: (1) an interaural level difference (ILD) parameter; and (2) at least one of an interaural time difference (ITD) parameter and an interaural phase difference (IPD) parameter, or to establish that there would have been a reasonable expectation that a successful device could be produced with such a modification.

The Examiner has stated that it would have been obvious to have modified Irwan to include these features “*for obtaining a directional cue of the produced sound.*”

Again, however, the Examiner fails to explain how or why it is believed that such a modification would indeed “*obtain a directional cue of the produced sound*” or how or why one of ordinary skill in the art at the time of the invention supposedly would have recognized this. Also, the Examiner fails to explain how or why anyone even would be trying to “*obtain a directional cue of the produced sound*” for Irwan’s multichannel audio converter for a karaoke machine.

Moreover, the Examiner fails to establish that there would have been a reasonable expectation that a successful device could be produced with such a modification.

Finally, Applicants respectfully submit that the Examiner fails to establish the level of ordinary skill in the art of invention of claim 18. Therefore, Applicants respectfully submit that the Examiner does not satisfy the requirements for maintaining a rejection under 35 U.S.C. § 103.

Accordingly, Applicants respectfully request that the Board reverse rejection of claim 18.

For all of the foregoing reasons, Applicants respectfully submit that the rejections of claims 1-8, 11-13, 15-18 and 20-22 are all in error. Therefore, Applicants respectfully request that that the Board reverse the rejections of claims 1-8, 11-13,

15-18 and 20-22, and the application be returned to the Examiner for further processing.

Respectfully submitted,

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## CLAIMS APPENDIX

1. (Previously Presented) In a decorrelator, a method of synthesizing a first and a second output signal from an input signal, the method comprising:

applying the input signal to a filter of the decorrelator to generate a filtered signal;

obtaining from an analysis circuit of the decorrelator a correlation parameter indicative of a desired correlation between the first and second output signals;

obtaining from the analysis circuit of the decorrelator a level parameter indicative of a desired level difference between the first and second output signals; and

applying the input signal and the filtered signal to a transformation circuit of the decorrelator and performing by a matrixing operation on the input signal and the filtered signal to transform the input signal and the filtered signal into the first and second output signals, where the matrixing operation employs the correlation parameter and the level parameter.

2. (Original) A method according to claim 1, wherein the matrixing operation comprises a common rotation by a predetermined angle of the first and second output signals in a space spanned by the input signal and the filtered input signal; and where the predetermined angle depends on the level parameter.

3. (Original) A method according to claim 2, wherein the predetermined angle is selected to maximize a total contribution of the input signal to the first and second output signals.

4. (Original) A method according to claim 1, further comprising scaling each of the first and second output signals to said desired level difference between the first and second output signals.

5. (Original) A method according to claim 1, wherein the filtering of the input

signal comprises all-pass filtering the input signal.

6. (Original) A method according to claim 5, wherein the all-pass filter comprises a frequency-dependant delay.

7. (Previously Presented) A device for synthesizing a first and a second output signal from an input signal, the arrangement comprising:

a filter for filtering the input signal to generate a filtered signal;  
an analyzer for obtaining a correlation parameter indicative of a desired correlation between the first and second output signals, and for obtaining a level parameter indicative of a desired level difference between the first and second output signals;  
a transformation circuit for transforming the input signal and the filtered signal by a matrixing operation into the first and second output signals, where the matrixing operation depends on the correlation parameter and the level parameter.

8. (Previously Presented) The device of claim 7, further comprising  
an input unit for receiving an encoded audio signal;  
a decoder for decoding the encoded audio signal to produce the input signal.

11. (Previously Presented) The method of claim 1, wherein applying the input signal to the filter to generate the filtered signal comprises applying the input signal to an all-pass filter.

12. (Previously Presented) The method of claim 11, wherein applying the input signal to the all-pass filter to generate the filtered signal comprises applying the input signal to the all-pass filter wherein the all-pass filter provides a frequency-dependent delay element wherein the delay at a frequency  $Y$  is less than a delay at a frequency  $X$ , when  $Y > X$ .

13. (Previously Presented) The method of claim 11, wherein applying the input

signal to the all-pass filter to generate the filtered signal comprises applying the input signal to the all-pass filter comprising one period of a Schroeder-phase complex.

15. (Previously Presented) The device of claim 7, wherein the filter means comprises an all-pass filter.

16. (Previously Presented) The device of claim 15, wherein the all-pass filter provides a frequency-dependent delay element wherein the delay at a frequency  $Y$  is less than a delay at a frequency  $X$ , when  $Y > X$ .

17. (Previously Presented) The device of claim 15, wherein the all-pass filter comprises one period of a Schroeder-phase complex.

18. (Previously Presented) The device of claim 7, wherein the means for obtaining the correlation parameter and the means for obtaining the level parameter comprise an analysis circuit that receives a set of spatial parameters pertaining to the input signal including at least: (1) an interaural level difference (ILD) parameter; (2) at least one of an interaural time difference (ITD) parameter and an interaural phase difference (IPD) parameter; and (3) a maximum value of a cross-correlation function parameter, and extracts from the set of spatial parameters the correlation parameter and the level parameter.

20. (Previously Presented) In a data processing system, a method of synthesizing a first and a second output signal from an input signal, the method comprising:

employing processing means of the data processing system to filter the input signal to generate a filtered signal;

employing the processing means to obtain a correlation parameter indicative of a desired correlation between the first and second output signals, and to obtain a level parameter indicative of a desired level difference between the first and second output signals; and

employing the processing means to perform a matrixing operation on the input signal and the filtered signal to transform the input signal and the filtered signal into the first and second output signals, where the matrixing operation employs the correlation parameter and the level parameter.

21. (Previously Presented) The method of claim 20, wherein filtering the input signal to generate the filtered signal comprises performing an all-pass filter operation.

22. (Previously Presented) The method of claim 20, wherein the processing mean performs the matrixing operation on the input signal and the filtered signal by multiplying the input signal and the filtered signal by:

$$\begin{pmatrix} \frac{c}{1+c} & 0 \\ 0 & \frac{1}{1+c} \end{pmatrix} \bullet \begin{pmatrix} \cos(\beta + \alpha/2) & \sin(\beta + \alpha/2) \\ \cos(\beta - \alpha/2) & \sin(\beta - \alpha/2) \end{pmatrix},$$

where the first output signal is  $L$ , and the second output signal is  $R$ ,

where  $c = |L - R|$ ,

where  $\alpha$  is an angular difference between  $L$  and  $R$ , and

$$\text{where } \beta = \tan^{-1} \left[ \left( \frac{1-c}{1+c} \right) \bullet \tan(\alpha/2) \right]$$

**EVIDENCE APPENDIX**

{None}

**RELATED PROCEEDINGS APPENDIX**

{None}